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ABSTRACT

To assess the success of third grade readers in segmenting written text into the ideational groupings judged appropriate by adult readers, 22 students were given two prose selections and told to mark each location where a good reader might pause or take a breath while reading a story out loud. Their pausal locations were then compared to those marked by 31 college students. The parsing performances of the third graders were analyzed according to the logic of signal detection theory, and the scores were compared with the readers' subtest scores on standardized achievement and reading diagnostic tests. The results indicated that, as a group, the third graders were surprisingly accurate in designating the correct pausal locations. Individually, poorer readers made more errors than good readers. There was also evidence that parsing performance bore a statistically significant relationship to the standardized achievement and diagnostic subtest scores. The ability to correctly segment words into syllables appeared to be the same ability that permitted readers to correctly segment the words of a text into constituent phrase structures. The results also support the hypothesis that the development of reading skills may be mediated through the development of a spatio-ideational ability called "cognitive demarcation," which may play a critical role in learning to read. (FL)

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Ideational Phrasings in Reading as Related to Reading Competencies[1]

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As reading skills develop, the reader becomes successful in apprehending the individual words not as isolated words but as integrated components of larger phrasal and sentential groupings (Bond & Tinker, 1973, pp. 384-389; Gibson & Levin, 1975, pp. 382-385; Harris & Sipay, 1975, pp. 461-466). If a reader is to encode the semantic intents of the author, the reader's ideational groupings must show some parallel to those of the author. The reader's task, fortunately, is made easier by the presence of typographical cues such as commas and periods. As the reader becomes even more skilled, increased sensitivities are shown to ideational patternings signaled by prepositional phrases, subordinate and coordinate clauses, adjective-noun units, and subject-verb contingencies (Kowal, O'Connell, O'Brien, & Bryant, 1975). With such constituent phrase groupings, the reader becomes capable of fusing the meanings of individual words into unified ideational representations similar to that of the author (Bond & Tinker, 1973).

The present research is an exploratory investigation of the success of third grade readers in segmenting written text into the

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ideational groupings parsed by skilled college readers. Following the logic of signal detection theory, the segmentation judgments of the individual third grade readers were scored according to their normative hit rates, false alarms, misses, signal discriminability ($\underline{d}'$) and response bias (Y_j). To gain insight into competencies related to such segmenting skills, the parsing scores achieved at the end of the third grade were compared with second grade achievement scores, reading diagnostic test results at the beginning of the third grade, and achievement test performances at the end of the third grade. The standardized test performances were then used as independent variables in stepwise multiple regression analyses to predict the various segmentation performances. Factor analysis also allowed insight into the relationship of the parsing abilities to the factorial structure of the achievement test scores. Finally, a discriminant analysis of the best versus the poorest readers, as judged by third grade reading comprehension test scores, examined the possibility that the two groups of readers also might differ significantly on their parsing performances.

Method

Subjects. The third grade readers were an intact class of 22 students in a suburban school. At the time the experiment was conducted, the mean composite grade equivalent score on the Iowa Test of Basic Skills (Form V) was 5.2 (91%tile); the lowest grade equivalent score was 4.0 (62%tile). On the third grade reading comprehension test, the grade equivalents ranged from 3.7 to 6.9. Since deficiencies in parsing might be due to deficiencies in word

decoding rather than phrase groupings (Clay & Imlach, 1971; Cromer, 1970; Isakson & Miller, 1976), it is important to note that only 7 of the 242 3rd grade achievement test subscores were below the 50%tile nationally. Three of the seven scores below the 50%tile were earned by one student (Vocabulary, 33%tile; Reading Comprehension, 49%tile; and Spelling, 44%tile); three other students achieved %tile rankings of 49, 1?, and 29 in spelling; and another student achieved a %tile ranking of 46 in Math Problems. Overall, then, the readers showed advanced levels of reading achievement, and were not deficient in any of the basic skills of word decoding.

In addition to 17 subtest scores from the second and third grade administrations of the Iowa Test of Basic Skills, seven subtest scores from the Stanford Diagnostic Reading Test (Form W) also were available for the various analyses. The third grade Iowa subtests were: Vocabulary, Reading Comprehension, Spelling, Capitalization, Punctuation, Usage, Map Reading, Graphs and Tables, Reference Materials, Math Concepts, and Math Problem Solving. For the 19 Ss who also had taken the Iowa Test at the end of the second grade, the available subtest scores were: Vocabulary, Word Analysis, Reading, Spelling, Math Concepts, and Math Problems. The Stanford Diagnostic Reading Test, administered at the beginning of the third grade, contained the following subtests: Reading Comprehension, Vocabulary, Auditory Discrimination, Syllabication, Beginning & Ending Sounds, Blending, and Sound Discrimination.

Textual passages. The textual selections that the readers segmented were adaptations of two prose selections taken from two

third grade readers (Clymer & Wulfing, 1973; Harris & Clark, 1965). To minimize the possibility that the segmentation performances would be determined by decoding difficulties (Clay & Imlach, 1971; Harris & Sipay, 1975), unfamiliar words were replaced by familiar words, and awkward syntax was avoided. One experimental passage, entitled "Man's Best Friend," contained 297 words; the second passage, entitled "The Land of the Friendly Penguins," had 304 words.

Segmentation of textual passages. A sample of 31 college students enrolled in a graduate level course in educational psychology judged the locations in the textual passages which were psychologically acceptable for pausing. Raters were told that the function served by pausing might be to catch a breath, to give emphasis to the passage, or to enhance meaning (Johnson, 1970). The Ss indicated their pausal judgments by inserting vertical slashes on written copies of the stories. Acceptable locations for pausing were operationally defined as the junctions elected by a majority of the college normative group. The passage entitled "Man's Best Friend" thus was judged to have 49 acceptable pausal locations, while "The Land of the Friendly Penguins" had 45 appropriate pausal locations.

For the third graders the pausal instructions were phrased simply enough to be understood. Specifically, the third graders were asked for their "best judgments or opinions as to where a good reader might pause or take a breath while reading a story out loud" so that "the persons who are listening to you will be better able to understand the story." Special note was made of periods and

commas as being places where a reader could pause, and several examples of proper and improper locations for pausing were discussed. Finally, a 248 word practice story was partitioned by having the individual readers make slashes, and the appropriate locations then were discussed with their teacher.

Scoring. For each of the two prose passages, each third grader was scored according to hit rate, false alarm rate, total errors (false alarms and misses), total pausal slashes, a measure of pausal response bias (Y_j) comparable to beta (β), signal detection sensitivity (d') as computed from the Hockhaus (1972) tables, a weighted hits score determined by an averaging of weights assigned according to the number of college raters electing a slash at the same location, and a similar weighted score for all slashes. Since the third grader's scores on each of the two prose passages were highly correlated, ranging from the lowest r of .77 for the two response bias scores to the highest r of .97 for the two hits scores, composite pausal scores were used in the analyses.

Results

As a group, the third graders were surprisingly accurate in designating the correct pausal locations. The mean number of hits was 78.8 out of 94 pausal locations for a hit rate of .84 (σ = .17). Each S also averaged 22.4 false alarms for a false alarm rate of .04 across all 599 word boundaries. All of the false alarms occurred at 59 of the possible 505 error locations.

Each of the eight pausal variables was used as a dependent variable in a stepwise multiple regression analysis. The 24

standardized subtest scores served as potential independent variables. Entry into the regression equation was permitted only when the new predictor accounted for a significant ($p < .05$) increment of the residual variance. As may be seen in Table 1, the multiple (or simple) r's ranged from .49 to .65.

The Stanford Syllabication subtest was the only variable entering into the prediction of three variables: (1) pausal hit rate, (2) total slashes, and (3) pausal response bias (Y_j). Higher scores on the Stanford Syllabication task were associated with higher hit rates ($r = .59$), more slashes ($r = .57$), and higher pausal response bias ($r = .60$). Higher scores on the Iowa third grade References subtest were associated with fewer total errors ($r = -.47$) and superior parsing accuracy as exemplified in d' ($r = .51$). Higher scores on the Iowa third grade Maps subtest were associated with a lower false alarm rate ($r = -.49$), and a greater correspondence with experts' placements as indicated both by the weighted hits score ($r = .46$) and the total slashes weighted score ($r = .46$). Contrary to what might be expected, the Iowa second grade Math Concepts scores were negatively correlated with the experts' weighted hits score ($r = -.27$) and the total slashes weighted score ($r = -.26$). Similarly, higher performances on the Iowa second grade Math Concepts subtest was associated with a somewhat greater number of total errors ($r = .25$).

To gain additional insight into the interrelationships among the 24 achievement-diagnostic variables and the eight pausal variables, a factor analysis was performed. A principal-components solution, with communalities estimated as unity, was followed by

orthogonal rotation. With the criterion for rotation set at eigenvalues greater than unity, the analysis yielded seven independent factors. As defined by factor loadings higher than .30, the segmentation variables entered into two of the factors. Factor II in the analysis had high positive loadings on three measures of correct pausaling: hit rate, 67, weighted hits, .99; signal detection accuracy, .97; and negative loadings on two variables: total errors (-.97) and false alarm rate (-.87). Two of the achievement variables also had significant positive loadings on this factor: third grade Map Reading, .48; and Reference Materials, .37. Factor III in the analysis showed heavy loadings on the response bias measures of total pausal slashes (.98) and Y_j (.98), hit rate (.72) and false alarm rate (.47), a major loading on the Stanford Syllabication test (.61), and a smaller loading from the third grade Math Problem Solving subtest (.34). Overall, the factor analysis and the multiple regression analyses document the fact that the readers' performances on the pausaling tasks were related statistically to their performances on the standardized tests.

Are such parsing performances related to reading comprehension? To shed light on this question, the eight pausal variables were entered into a stepwise discriminant analysis as potential independent variables in discriminating between the good and poor readers. The "good" readers were defined as those 12 third grade readers with grade equivalent scores of 5.3 to 6.9 on the third grade Iowa Reading Comprehension subtest while the 10 "poor" readers were defined through grade equivalent scores of 3.7 to 4.8. Entry as a

discriminating variable was based upon Rao's criterion, and entry was permitted only when the new variable contributed a significant increment ($p < .05$) of separation to that produced by the previous set of independent variables in the analysis. The only significant variable differentiating between the two reading groups was the total number of pausal errors ($p < .03$); the canonical correlation was .48. The "poor" readers averaged 47.7 errors whereas the "good" readers averaged only 27.3 errors.

Discussion

Readers' abilities to segment prose into ideational constituents, as reflected by the pausal variables, thus appear related to the readers' competencies on standardized achievement and diagnostic subtests. As shown by the discriminant analysis, for example, the poorer readers were more likely to make pausal errors than the good readers. The present data are not sufficient to establish a causal link between such segmentation behaviors and poor reading, but the results clearly are consistent with such linkages.

Due to the small sample of readers in the study, as well as the high ability levels of the sample, it is uncertain as to the population of readers to which the present results apply. In addition, some of the statistical techniques used in the present study are more appropriately applied when the ratio of subjects to independent variables is larger. Even so, the present results provide for interesting speculation regarding the possible relationships existing between the various pausal judgments in reading and the readers' cognitive competencies.

The hit rate, for example, was closely associated with the readers' performances on the Stanford word syllabication test. However, since performance on the word syllabication task also was directly related to pausal response bias (Y_j) and total slashes, the first interpretation that comes to mind is that a high hit rate is simply a consequence of a willingness to slash. This interpretation is made untenable, however, by the fact that the Stanford word syllabication test is in multiple choice format, and the reader's willingness to slash thereby cannot determine his performance. Equally important, as reported in the Manual of the Stanford Diagnostic Reading Test (p. 29), an experimental version of the syllabication test was found to correlate .85 with the ability to actually divide words into syllables with vertical dividing lines. Overall, the evidence is consistent with the thesis that the grouping ability that permits a reader to correctly segment words also may be the same ability that allows him to correctly segment a concatenation of words into meaningful constituent phrases.

Perhaps the best overall measures of the readers' ideational parsing are to be found in the d' measure of signal discriminability and the two scores weighted according to normative judgments of the experts. The opposite side of the coin, the poorness of the reader's parsings, is represented in the reader's false alarm rate and the number of total errors. The multiple regression analyses showed clearly that these measures of ideational parsing are related to a number of achievement and diagnostic test performances. Most intriguing, however, is that the parsing variables in the factor

analysis were accompanied by the variables of 3rd grade Map Reading, References, and Stanford Syllabication. What do all these variables have in common? It is tempting to postulate that the ability that mediates all of these performances is one of "knowing or finding one's way around" with respect to ideational-spatial configurations and patternings. In short, there may be some skill that could be labeled as "cognitive demarcation," and this skill may play a critical role in learning to read. The writers of the Teachers Guide of the Iowa Test may have been amazingly prophetic, either deliberately or unwittingly, when, in discussing suggestions for developing map reading skills, stated:

> "Map reading involves a group of specific abilities. In developing these abilities, the teacher faces the same problems that the primary reading teacher encounters in teaching the pupil to read the printed page." (1972, p. 44).

Summary

An assessment was made of the success of individual third graders in segmenting two textual passages into the ideational groupings judged appropriate by skilled college readers. The parsing performances were analyzed according to the logic of signal detection theory, and the scores then were compared with the readers' subtest scores on standardized achievement and reading diagnostic tests. As shown by a discriminant analysis, the poorer readers were more likely to make segmentation errors than the good readers. Multiple regression analyses and a factor analysis provided evidence that the parsing performances bore statistically significant relationships to the standardized achievement and diagnostic subtests. The ability to correctly segment words into syllables appeared to be the same ability that permitted readers to correctly segment the words of text into constituent phrase structures. The results also supported the hypothesis that the development of reading skills may be mediated through the development of a spatio-ideational ability or skill called "cognitive demarcativeness."

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Table 1

Significant Predictors of Pausal Variables in

Stepwise Multiple Regression Analyses

Potential Independent Predictor Variables		Dependent Variable	Actual Independent Predictor Variables	p	Multiple or Simple r
Iowa Test of Basic Skills - Grade 3	Vocabulary Reading Comprehension Spelling Capitalization Punctuation Usage Map Reading Graphs and Tables Reference Materials Math Concepts Math Problem Solving	Hit Rate	Stanford Syllabication	$p < .008$	$r = .59$
		Total Slashes	Stanford Syllabication	$p < .011$	$r = .57$
		Y_j	Stanford Syllabication	$p < .006$	$r = .60$
		False Alarms	Map Reading--3rd Grade	$p < .033$	$r = -.49$
		Total Errors	References--3rd Grade Math Concepts--2nd Grade	$p < .045$ $p < .045$	$r = .63$
Iowa Test of Basic Skills - Grade 2	Vocabulary Word Analysis Reading Spelling Math Concepts Math Problems	d'	References--3rd Grade	$p < .026$	$r = .51$
		Weighted Hits	Map Reading--3rd Grade Math Concepts--2nd Grade	$p < .050$ $p < .028$	$r = .65$
Stanford Diagnostic Reading Test - Grade 3	Reading Comprehension Vocabulary Auditory Discrimination Syllabication Beginning & Ending Sounds Blending Sound Discrimination	Weighted Slashes	Map Reading--3rd Grade Math Concepts--2nd Grade	$p < .048$ $p < .030$	$r = .65$